

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE. — XLIII.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Metrocampa praegrandaria* Guenée.

*Egg.* Elliptical, thick, one diameter less, evenly rounded, the ends nearly alike, no depression or truncation. Laid in small groups, erect on the antemicropylar end, strongly adherent. Reticulations regularly hexagonal, small, narrow, obscure, not raised; on the large sides there is an indication of ribbing in that the reticulations are more longitudinally placed; ends smoother. Yellow, turning red. Size .8 × .6 × .55 mm. Hatched in 11 days.

*Stage I.* Head round, bilobed, pale brown, sutures darker; width about .4 mm. Body short, rather robust, subventral fold widened a little segmentarily. Pale yellowish, a broad dorsal, narrow linear subdorsal and substigmatal dark red lines; a row of subventral red spots on joints 5 to 9. The lines do not quite reach the ends and are somewhat broken in the annulet folds. Cervical shield large, but concolorous. Tubercles small, brownish. Setae distinct, pale, moderate, scarcely enlarged at the tips. Abdominal feet on joints 10 and 13 only.

*Stage II.* Head bilobed, luteous, immaculate; width .6 mm. Body moderate, pale green, dorsal line broad, subdorsal narrow, lateral clouded, substigmatal and traces of subventral lines all vinous brown, the latter three obscurely joined by large clouded patches on joints 5 to 9. Feet pale; tubercles obsolete; setae short, obscure.

*Stage III.* Head rounded, bilobed, dull luteous with distinct brown dots behind the eyes and faint ones in the vertical suture; width .9 mm. Body moderate, uniform, segments irregularly annulate; yellow luteous, dorsal line narrow, dark brown, broadly edged with light brown, subdorsal and lateral lines dark brown, the latter joined by large segmentary spots to upper and lower subventral lines, shaded on joints 10-13. Feet pale; tubercles small, slightly raised; setae short, dusky.

*Stage IV.* Head pale greenish brown, finely dotted with dark over the lobes except a streak on the vertex of each; width 1.2 mm. Body moderately elongate, feet of joints 10 and 13 remote and a small pair of feet on joint 9, the feet approximate; segments wrinkly, irregularly annulate, uniform, smooth. Olivaceous yellowish, shaded with brown. Dorsal line dark brown in a lighter brown cloud; subdorsal, lateral, and stigmatal lines narrow, light, indicated by clouded brown edges; a distinct substigmatal line and subventral spots of dark brown. Feet pale, the anal ones projecting laterally. Tubercles concolorous, with dark hair dots; setae fine, pale; in the subventral region some pale secondary root-like prominences are mixed with the longer setae of tubercles vi and vii. (These prominences are not present in stage III and the extra feet are barely indicated.) The intersegment of joints 7-8 is more darkly shaded; dorsal tubercles more or less brown marked. The larvae rest flat on the bark.

*Stage V.* Head bilobed, thick, greenish white with numerous angular black spots composed of dots which are larger in a curved band from ocelli to before vertex, framing the face; width 1.8 mm. Body moderate, flattened ventrally, with a series of white rootlets along the subventral edge; feet on joints 9, 10, and 13, those of joint 9 small, but used. Bark brown, wrinkly, dorsal line dark, subdorsal, lateral and two subventral lines pale, fine, all obscure; subdorsal dark intersegmental blotches, especially centrally, darkest on the intersegment

7-8. Venter pale; no secondary hairs, the primary ones of tubercle vii scattered among the rootlets. Feet all pale greenish.

Spun a slight cocoon. One moth emerged the same season, but most hibernated in the pupal stage, making the species normally single brooded. Larvae from Kaslo, British Columbia; they fed on the leaves of white birch.

#### LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—XLIV.

BY HARRISON G. DYAR, WASHINGTON, D. C.

##### *Mesoleuca gratulata* Walker.

*Egg.* Elliptical, thick, the antemicropylar end strongly depressed, top and bottom concavely flattened medially, micropylar end flattened. Rather coarsely wrinkly shagreened all over except on the side of attachment, no reticulations. Uniformly pale yellow. Size  $.8 \times .7 \times .5$  mm.

*Stage I.* Head cordate, black, the color diluted centrally, the pointed mouth brown. Body normal, moderately elongated; all pale yellow, tubercles small, blackish, a little raised; cervical shield dusky luteous, obscure; setae distinct, rather long, dusky, glandular tipped.

*Stage II.* Head bilobed, pale yellow, eye black, mouth brown. Body moderate, green, roughened by the tubercles and annulets, translucent, unmarked; tubercles slightly raised, concolorous; feet green; setae pale, distinct; feet of joints 10 and 13 rather remote.

*Stage III.* Head rather long, slightly bilobed, pale testaceous, eye black, mouth brown; width .9 mm. Body translucent green, no shields, a narrow, broken, white subdorsal line, a faint white shade each side of the dorsal vessel, a narrow, waved lateral line and subventral fold whitish. Tubercles large, elevated, smooth, concolorous, shining. Setae rather long, pale, curved; spiracles black edged.

*Stage IV.* Head rounded, bilobed, lobes full, clypeus moderate; green, shining; eye black, jaws brown; width 1.3 mm. Body not elongate, the central segments not much longer than wide, cylindrical, subventral fold prominent, roughened by the tubercles. Green, intersegmental folds yellowish; a waved subdorsal line, narrow lateral one, and substigmatal line white, dull, obscure. Tubercles white, curved backward. Spiracles black; feet pale.

Larva from Kaslo, British Columbia.

#### LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—XLV.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Hydriomene magnoliata* Guenée. My specimen agrees more nearly with Hulst's type of *Hydriomene pernotata* Hulst than with some eastern specimens

of *Coenocalpe magnoliata*; but I do not see any specific difference between these two forms. Dr. Hulst placed them in separate genera, but he differentiates these genera only in that HYDRIOMENE has the thorax tufted posteriorly while COENOCALPE is not so. Now several *C. magnoliata* from Maine, New York, and New Jersey before me have fully as large thoracic tufts as Hulst's type of *H. pernotata*, and some of these specimens have been labeled *C. magnoliata* for me by Dr. Hulst. Therefore I would transfer *C. magnoliata* to HYDRIOMENE and place *H. pernotata* Hulst as a synonym of it. Henry Edwards is credited with a description of the larva in Proc. Cal. acad. sci., feeding on FUCHSIA GERANIUM, etc.

*Egg.* Rounded elliptical, flattening marked but rounded, micropylar end truncate, narrower than the center, the other end depressed. Reticulations roundedly hexagonal, low, rounded, distinct, becoming larger at the truncated end, finely granular shagreened all over; cell areas distinctly hollowed; pale yellow. Size  $.8 \times .6 \times .4$  mm.

*Stage I.* Head rounded, full, clypeus high; pale luteous, faintly brownish spotted on the tubercles, ocelli black. Body moderate, normal, pale whitish, unmarked. Tubercles small, dusky; setae moderate, pale, glandular tipped. Segments irregularly wrinkled annulate; no shields; feet pale.

*Stage II.* Head scarcely bilobed, erect, whitish with faint dusky spots on the sides of the lobes, ocelli black; width .6 mm. Body moderate, whitish, green from the food except at the end, a narrow diffuse dusky green dorsal line; tracheal line white. Tubercles concolorous, obscure; setae short, black. A barely indicated pale subdorsal line; feet pale.

*Stage III.* Head rounded, the apex in joint 2 green, freckled with purplish; width .85 mm. Body moderate, slender, smooth green; subdorsal, lateral, and stigmal lines greenish white, hardly contrasted; dorsal vessel dark, marked on joints 11 and 12 with purple brown. Feet pale; tubercles obsolete; setae short, dark. A little purple shading on the foot of joint 10.

*Stage IV.* Head rounded, bilobed, often held flat; green, finely brown freckled over the vertex, mouth white; width 1.5 mm. Body moderate, rather slender, segments wrinkled posteriorly. Green, white shaded, dorsal vessel green; subdorsal line white, not contrasted, subventral fold whitish. Thoracic feet faintly brownish; a purple band on the foot of joint 10 edged with white, a white line on the anal foot; a dorsal purple band on joints 12 and 13. Tubercles small, round, white, elevated; setae short, black. Some of the larvae became suffused with reddish dots bordering the pale lines or the subventral fold broadly pink shaded.

The larvae fed upon fire weed (*Epilobium angustifolium*), which seems to be their natural food plant. Larvae from Kaslo, British Columbia.

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—XLVI.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Hydriomene multiferata* Walker.

*Egg.* Roundedly elliptical, truncation, flattenings, and depression distinct, but all rounded; evenly, smoothly reticulate with rather broad, slightly raised lines forming rounded hexagonal cells; pale yellow. Size  $.6 \times .5 \times .4$  mm.

*Stage I.* Head rounded bilobed, erect, clypeus high and broad; yellowish whitish with large smoky brown dots on the tubercles; setae dusky. Body elongate and very slender looking, finely annulate, pale yellow; dorsal and subdorsal purple brown lines, varying in width, streaked on the annulets. The long central segments are double, composed of an elongate small intersegmental portion and a larger central one bearing the setae. On the intersegmental subsegments are traces of an addorsal line which curves outwardly distinctly on joint 11. Broken, streaked lateral, subventral and adventral lines; no shields; setae short, of the shape of bulbs with short stems; tubercles brown.

*Stage II.* Head pale whitish dotted with brown; tubercles blackish; width .5 mm. Body slender, elongate; green from the food, the lines red brown, pulverulent; dorsal line straight, addorsal represented by traces, subdorsal and lateral broken, substigmatal nearly continuous, subventral and ventral broken; feet pale; setae short; tubercles minute, obscure.

*Stage III.* Head round, full at sides, whitish with black dots on the faces of the lobes; width .9 mm. Body slender, pale green from the food, dorsal line narrow, fluctuating, brown black, divaricate on joint 2, absent on the anal plate; faint traces of lateral, suprastigmatal, and substigmatal lines on central segments. No shields; tubercles concolorous; setae short black, capitate.

*Stage IV.* Head rounded, slightly elongate, clypeus depressed, oblique; whitish, opaquely translucent, a broad brown shade on the angle of the lobe, the pair converging to the vertex; antennae pale, ocelli black; width 1.4 mm. Body slender, elongate, central segments over twice as long as wide, the intersegmental portion slenderer, ends shrunken, abdominal feet approximate. Soft green, a little white shaded; cervical shield yellowish with brown blotches and from it a broad dorsal band runs backward, rapidly narrowing and vanishing on joint 5; a brown dash on joint 12 and 13 anteriorly. A narrow, nearly invisible white subdorsal line. Annulet incisures a little clearer. Tubercles obsolete, setae short, dark. Thoracic feet reddish. The dorsal band may run the whole length except on the anterior half of joint 9.

The larvae formed pendent cocoons of earth attached to a leaf. Standing on a leaf they reached bits of earth which they spun about themselves with a soft web, beginning around the anal feet. The cocoon forms a loose bag of web covered with dirt hanging from the leaf. The fire weed was preferred as a food plant. Larvae from Kaslo, British Columbia.

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—XLVII.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Hydriomene excurvata* Grote.

*Egg.* Elliptical, flattened, depression well marked, cuneiform from side view, the other end rounded, scarcely truncate; reticulations irregularly hexagonal, neat, distinct, moderately broad, low raised, cell areas flat. Pale yellow, shining. Size  $.8 \times .6 \times .5$  mm. Laid singly, adherent.

*Stage I.* Head rounded, sordid smoky shaded, pale at the mouth, the eye black, prominent. Body moderate, normal, sordid gray from within, dark granular on a whitish ground; no marks; no shields; tubercles small, but the setae distinct, rather long with swollen, club-shaped tips.

*Stage II.* Head strongly bilobed, thickly mottled with dark brown, the paler ground color hardly showing, ocelli black; width .4 mm. Body moderate, normal, sordid luteous, obliquely striped in dark brown; the stripes start in an intersegmental dorsal patch, edged by whitish, run obliquely forward to join a submacular subventral zigzag shade; a geminate ventral band. Setae dark with clear swollen tips. Ordinary lines obsolete, a pale geminate dorsal and subdorsal indicated.

*Stage III.* Head strongly bilobed, thickly mottled in dark brown with a pale streak on the apex of each lobe; width .6 mm. Body moderate, the segments annulate, tubercles elevated, setae short and pale with swollen tips. Pale luteous, heavily obliquely striped with blackish brown, starting from strong intersegmental spots, forward and downward, joining, or nearly so, a series of reversed subventral stripes. An adventral shaded band and slight narrow dorsal and subdorsal ones. Thoracic feet brown; abdominal ones pale on the outside.

*Stage IV.* Head rounded, bent downward, gray black with a bright white streak before the apex of each lobe and another above the eyes; width .95 mm. Body moderate, thicker behind, the segments a little widened on the subventral fold, finely annulate; latticed in dark brown and pale yellow; a narrow dorsal brown line in a brownish yellow ground, enclosed by a series of diamond-shaped brown marks, shaded and obscure toward the thorax, on joints 11 and 12 represented by only the posterior half of the marking; a series of broad lateral shades run obliquely posteriorly and shade into a broad, adventral dark brown band. Tubercles pale, hair dots dark; setae short, dark, capitate, the tubercles somewhat elevated. No shields.

*Stage V.* Head rounded bilobed, rather sharply so, sordid gray brown, an obscure pale streak on the vertex of the lobe; width 1.2 mm. Body thick, robust, stick-like, straight, the thorax a little smaller, the segments irregularly annulate, skin finely granular. Anterior half of larva darkly shaded, the posterior half light yellowish dorsally; oblique black brown lines as before, obscured anteriorly, joining a subdorsal blackish waved line; a dorsal line, slightly broken intersegmentally, then obsolete, on joints 11 and 12 the marking represented only by subdorsal dots. Venter dark, leaving a pale ventral line. Tubercles small, slightly elevated; setae short, black, subcapitate. A broad, bright, pale yellow bar on joint 2 subdorsally. Feet of joint 10 light outwardly.



Eggs were obtained as early as July 5th when the moths had only just begun to fly, but all the larvae hibernated. Many were very small, only a few reached the fifth stage in the autumn. They were fed on POLYGONUM, but are probably rather general feeders on low vegetation at the ground. The coloration is adapted both for concealment in such a situation and for hibernation at any stage after the first. Larvae from Kaslo, British Columbia.

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—XLVIII.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Deilinia erythremaria* Guenée. My adults agree with Vancouver Island specimens, called *Deilinia pacificaria* Packard. I do not think that the form is specifically distinct from the Atlantic coast *D. erythremaria* Guen. The slightly larger size and very slightly more distinct markings do not seem to justify more than a racial distinction. In Bulletin 52, U. S. nat. mus., Dr. Hulst credited the European *D. exanthemata* Scop. to "Canada." If this is correct, I would refer both *D. pacificaria* and *D. erythremaria* as varieties of the European species, though I think it is more probable that the European form does not occur in America at all. The European larva is described as entirely green or with pale dorsal lines.

*Egg.* Elliptical, strongly compressed but without flattened areas, depression marked, truncation broad and sharp edged; reticulations linear wavy longitudinal lines, 9 or 10 visible on the flat side, raised, finely waved, in one place two confluent, projecting at the rim of the truncation, confused at the other end. Cross-striae fine, distinct, forming elongate rectangular cells; truncation nearly smooth, obscurely reticulate, concave, raised at the micropyle. Color dull bluish green. Size  $.8 \times .6 \times .4$  mm.

*Stage I.* Head rounded, depressed at clypeus, pale orange, shining. Body slender, normal, rapidly looping. Pale yellowish with dorsal and subventral red brown lines the whole length, narrowed just at the ends. No shields; feet pale. Tubercles moderately large, not elevated, setae minutely capitate.

*Stage II.* Head flattened, rounded, held flatly; whitish with a blackish band behind ocelli and a faint vertical one, both continuing lines of the body. Width about .5 mm. Body slender, elongate, whitish, appearing green throughout from the food. A distinct black brown dorsal stripe from joint 2 anteriorly to 13, fading on the anal flap; a similar stigmatal line. Feet pale. Setae very short with the tubercles not visible.

*Stage III.* Head rounded bilobed, flattish but the lobes full, oblique; pale luteous green, not shining; a dark mark in the vertical suture and a heavy brown side band behind the ocelli of brown black; width .8 mm. Body rather slender, translucent green from the food, not shining, not annulate. Dorsal and subventral stripes blackish brown, moderately broad, even, sharp, covering the outside of the feet of joints 10 and 13. Thoracic feet pale; tubercles and setae invisible; no shield.

*Stage IV.* Head rounded, flattened, especially towards the mouth, apex rather full, held flat; clear green, a brown black stripe from ocelli; antennae and jaws black; width 1.3 mm. Body moderate, smooth, clear green; a dorsal series of brown black segmentary spots obsoletely connected by a shade; a trace of a white subdorsal line especially posteriorly; substigmatal band brown black, segmentarily widened, covering the foot of joint 10 and a line on that of 13. Thoracic feet green. A median ventral whitish line segmentarily widened. Tubercles invisible; setae short dark.

*Stage V.* Head rounded, slightly bilobed, held obliquely flat; translucent green, not shining; clypeal sutures narrowly deepened; pale green; antennae and a stripe on side red brown; width 2 mm. Body moderate, cylindrical, normal; no shields; smooth, tubercles obsolete, setae minute, dark. Green; a diffuse white subdorsal stripe, faint on joints 2 and 13; a white addorsal patch centrally on the segments, divided by a black dash and surrounded except anteriorly by blackish powdering on joints 5 to 9, faint, however, on 5 and 9. A series of subventral brown black patches, obsoletely connected by a faint vinous shade, forming a line on the thorax and staining darkly the foot of joint 10 and the anterior side of the foot of 13. Subventral tubercles black marked; traces of lateral and stigmatal whitish lines, faint and obscure.

Larvae from Kaslo, British Columbia. They feed on willow.

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE. — XLIX.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Deilinia pulveraria* Hulst. One of Hulst's types before me from Rossland, British Columbia, agrees well with my Kaslo specimens, from which this life history was made out.

*Egg.* Laid very slightly adherent, detached at a touch. Rather full and rounded, flattening showing only as a less diameter, depression only at extreme end of egg but there marked, truncation marked, distinctly oblique. Over 20 longitudinal ribs, 9 visible on the broad side, sharp and high from a flat surface, narrow, compressed, slightly waved, ending at the edge of the truncation where they project like spines seen in profile view. Cross-striae low, distinct lines forming quadrangular cell areas and vertical lines on the ribs. The central pair of ribs join near the antemicropylar end. A line half way to the micropyle on the truncated end forms a row of cuneiform cells; micropyle reticulate. Color pale yellow, turning red. Size  $.8 \times .4 \times .3$  mm.

*Stage I.* Head small, bilobed, pale luteous, shining; eye black, mouth brown. Body slender, motion rapidly looping and vibrant; translucent whitish; a straight, rather broad purple brown dorsal band the whole length and a similar lateral one. No shields; tubercles minute, dark; setae small, obscure. Later green in color but the bands unchanged.

*Stage II.* Head pale creamy whitish, a mottled black band on the side behind the eyes; antennae black; a few dots at vertex; setae black, stiff; width .6 mm. Body moderate, normal, slender, green, smooth, no shields, setae stiff, black. A dorsal blackish band present.

faintly shadowed or obsolete, but leaving a series of elliptical segmentary spots on the anterior edges of joints 5 to 11; broad subdorsal and narrow waved lateral white lines faintly pigmented, only a trace of a stigmatal line; subventral black shade broken and dotted, but distinct. Feet pale; tubercles whitish with black hair dots.

*Stage III.* Head white, heavily black mottled and dotted over the vertex, a brown band back from the antennae, edged by black dottings; width 1.1 mm. Body moderate, not elongate, smooth, green. A dorsal geminate, pulverulent, black line, partly broken centrally on the segments, heavier at the ends and with scattered tributary dots in the dorsal space. Subdorsal line pale, greenish white; a faint waved lateral line, olivaceous edged above. Subventral region broadly blackish shaded. Hair dots black; spiracles black ringed; no shields, setae small, dark. Later all shaded with brown in dense crinkled lines, leaving narrow addorsal, broad subdorsal, narrow upper and lower lateral, subventral and broad medio-ventral bands of pale. Dorsal black intersegmentary spots.

*Stage IV.* Head rounded, flat before, oblique, the apex in joint 2. Ground color gray whitish on face, yellowish over lobes, heavily checkered with black especially in a band each side of the clypeus which converge to apex; clypeus dark reticulate; width 1.6 mm. Body moderate, flatly extended on a twig, colored like bark. Ground whitish and ochereous brown, checkered with black; dorsal line shaded, broken, pulverulent, forming patches at the anterior and posterior ends of the segments, with addorsal spots at tubercle i, making a lattice work. A quadrate black subdorsal patch breaking the yellowish subdorsal line behind tubercle ii. Sides heavily black shaded except around the spiracles. Lateral and substigmatal lines faintly traced; subventral line (tubercle vii) rather broad and whitish. Tubercles black; tubercle iv with white specks around it; spiracles pale.

Larvae from Kaslo, British Columbia. They fed on *CEANOTHUS*. The cocoon was spun at the ground of silk.

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—L.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Deilinia behrensaria* Hulst. Most of the female specimens are *D. behrensaria*, the males are all *D. cervinicolor*. This is almost a constant sexual difference. The varietal name seems scarcely warranted in any case.

*Egg.* Elliptical, neatly rounded, smaller in dorso-ventral diameter but not flattened; truncate end flat, neatly rounded, the other end depressed. Over 20 ribs running lengthwise, straight from the depressed end to the angle of the truncation, 9 visible on the broad side, sharp, rather high, narrow, gently waved, joined by low but distinct linear cross-striae forming rectangular cells about twice as wide as long. A distinct line runs around the edge of the truncation and another half way to the micropyle, the ribs in crossing these form somewhat cuneiform cells; micropyle confusedly reticulate. Color pale yellow, later irregularly spotted with red. Size  $.8 \times .7 \times .5$  mm.

*Stage I.* Head smooth, pale testaceous, eye black, mouth brown. Body moderate, yel-



lowish, shields concolorous; shaded with smoky blackish between the pale lines which are subdorsal, broken lateral, stigmatal and narrow subventral. Tubercles small, blackish in pale rings; setae black, stiff. Feet normal, not strongly plated. Later the color becomes green, a broad purple brown subventral band between the stigmatal and subventral white lines; joint 2 in front faintly testaceous.

*Stage II.* Head whitish, thickly dotted with black in a patch on sides of lobes and one on vertex; rounded, held obliquely; width about .6 mm. Body moderately elongate, ends contracted, normal. Whitish with green tint; traces of brown intersegmental dorsal line; broad subdorsal and stigmatal and narrow wavy lateral white lines, not very bright. A broad brown black subventral band a little interrupted anteriorly and weakened about the thoracic feet. Feet pale, tubercles black.

*Stage III.* Head white, thickly dotted with purple and black on vertex and patches on sides, held obliquely, antennae distinct, black spotted, width .9 mm. Body moderate, a little flattened, flatly outstretched, anal feet narrowly triangular, divergent. Green, addorsal white dots edging the dorsal vessel; subdorsal line white, not rigid, narrow, wavy; sides besides irregularly streaked in white. Tubercles black, ii the largest; anal feet black powdered; setae black; no shields.

*Stage IV.* Head purplish white, the upper half white, thickly mottled and spotted in black; tubercles black, antennae white, black spotted; width 1.1 to 1.3 mm. Body held flatly extended, anal feet square behind, colored like bark. Gray brown, black dotted reticulate; dorsal line geminate, black, crinkly, tubercles i and ii black, just above the white subdorsal line which is slightly black edged above. A faint white lateral line, black edged. Tubercles black, iv conspicuously so and surrounded by white, the remains of a substigmatal band which appears also as a dash on the anterior parts of the segments. Feet pale waxy white.

*Stage V.* Head rounded, the lobes slightly squared, flat before; purplish, speckled thickly with pale ochereous and black, black on the vertex and a curved band edging the disk of face; epistoma and bases of antennae whitish, tips of antennae ochereous; width 1.8 mm. Body equal, a little flattened, held flatly, feet moderate. Ochereous brown, speckled with black; broken subdorsal dots, dots at tubercles i, iii, and iv bright white; white triangular marks on anterior edges of segments 6 to 9 and less bright ones on 5 and 10, edged behind with black shading which runs back in an irregular geminate dorsal line, distinct on the thorax and joints 10-13. A heavy black lateral shade looped down segmentarily below the spiracles. Thoracic feet pale, abdominal ones purplish mottled with white. Tubercles small, black, elevated slightly. A series of black ventral marks anteriorly on the segments composed of a double arrow-shaped streak joined into a blunt X-mark, more or less continued over subventral area to the lateral black marks.

Pupation among leaves. Larvae from Kaslo, British Columbia. They fed on *CEANOTHUS*.

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—LI.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Deilinia litaria* Hulst. The specimens before me vary greatly; so much so that I am certain there will ultimately appear a considerable synonymy of this species. But I describe the larvae as *D. litaria*, as one of my specimens closely matches Hulst's type before me. The female moth is smaller than the male; both vary greatly in color and markings.

*Egg.* Elliptical with dorso-ventral flattening, micropylar truncation and depression normal, rounded, the truncation sharp and a little oblique. Coarsely quadrangulately reticulate, the longitudinal lines stronger than the transverse ones, forming apparent ribs, which are irregular, decreasing by confluence towards the ends and on the narrowing of the sides; raised, sharp, the cell areas flat on the bottom. A rather strong line borders the truncation which is strongly reticulate. Color pale yellow, turning red. Size  $.6 \times .4 \times .3$  mm.

*Stage I.* Head bilobed, pale testaceous, eye dark, mouth brown. Body slender, looping, vibrant; all pale yellowish, translucent, the food showing green. Very faintly indicated brown dorsal and subventral bands. Feet pale; tubercles and setae small, invisible.

*Stage II.* Head flattened, scarcely bilobed, mouth large, projecting; luteous, eye black, mouth brown; width about .5 mm. Body moderate, normal, translucent yellowish, the folded incisures more opaque, appearing brighter. Setae short, stiff, black, distinct, from minute tubercles; no markings.

*Stage III.* Head pale green, not shining, epistoma and antennae whitish, setae black; width .7 mm. Body rather slender, green; broad dorsal and subventral blackish olivaceous shaded bands edged by very faint subdorsal and stigmatal whitish lines. Setae black, short, pointed; tubercles minute. Feet pale; no shields.

*Stage IV.* Head bilobed, the clypeus depressed, oblique; green, setae black; width 1.2 mm. Body rather short, slender, sides roughened by coarse annulets. Green, dorsal line obscure, blackish, pulverulent, obscurely geminate, forming heavier dots on the anterior edges of segments 7 to 10. Subdorsal line yellowish white, narrow, obscure; a faint waved lateral line. The tracheal line shows yellowish white. Setae short, black, tubercles invisible; feet green; no shields. Another larva was brown, all shaded with smoky blackish, heaviest subventrally; tubercles black.

*Stage V. Green form.* Head rounded, oblique, apex in joint 2; green, sparsely blackish freckled, a faint yellowish shade upon angle of lobe; epistoma pale, antennae reddish; width 1.6 to 1.8 mm. Body moderate, smooth, bright green; a distinct white subdorsal stripe, crinkled edged, on joints 2 to 13; a narrow broken white addorsal line, edging the darker dorsal vessel, with blackish marks on joints 3 and 4; traces of a wavy lateral line; feet green; spiracles faintly reddish, black rimmed; no subventral marks. Tubercles and setae obscure, dark; hair dots black. *Brown form.* Head gray, heavily black checkered. Body gray, black checkered, alternating black lines and quadrate patches, dorsally and subdorsally; a partly broken narrow white subdorsal line. Sides with four black lines including a broken white lateral line; substigmatal line white; subventer heavily black shaded. Feet very pale, contrasted; anal plate and feet greenish.

Pupation in the ground. Larvae from Kaslo, British Columbia. They fed on CEANOTHUS.

## LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—LII.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Deilinia rectifascia* Hulst. I have Hulst's unique type, a female. A second female from the same place (Easton, Washington: Koebele) was named *Cymatophora rectifascia* by Dr. Hulst. A third female from Oregon (Koebele) was, however, named *Deilinia falcataria*; but this is, I think, erroneous. A male from Rossland, B. C., does not show a fovea below on the fore wings while it does on the hind wings and it would therefore seem that the species, while a good one, should be placed in *DEILINIA* rather than in *CYMATOPHORA*. Hulst had no male in writing his original description, which would render his generic reference uncertain.

*Eggs.* Laid weakly attached, some falling loose. Elliptical, wedge shaped in side view, flattenings not marked; truncation distinct, rounded. A series of low ribs running to the truncated rim, about 10 visible on the broad side, joined by fine cross-striae, forming elongate rectangular cells, the whole ill defined and dim, not very sharply raised yet considerably so; all minutely frosted shagreened; truncation convex, reticular. Color pale yellow, turning red. Size  $.8 \times .5$  .4 mm.

*Stage I.* Head rounded, pale luteous, a darker shade over vertex, eye black, mouth brown. Body slender, pale whitish, a dark red dorsal and lateral stripe on joints 2 to 13. Tubercles and setae minute; feet pale; no shields.

*Stage II.* Head slightly bilobed, oblique; whitish, a brown shade over vertex and a band below ocelli; width .55 mm. Body moderate, yellowish white; broad dorsal and subventral dark brown bands, even, straight, reaching the ends, but not staining the feet. Tubercles minute, black; setae short, fine; feet pale; no shields.

*Stage III.* Head rounded, clypeus and sutures slightly depressed; pale yellowish, brown shaded and mottled over the lobes; antennae, jaws, and a band behind eyes dark; ocelli black; width .8 mm. Body moderate, green from the food; dorsal band broad, blackish brown, diluted with greenish, showing small intersegmental black dashes and edged by a faint, pale, subdorsal line. Subventral band present, broken into shaded patches, or obsolete. Tubercles invisible; setae short, black; feet pale; a double stigmatal obscure pale line.

*Stage IV.* Head as before; width 1.15 mm. Body green; a faint yellowish subdorsal line; a series of small brown dorsal intersegmental spots, confluent on the thorax, approximate by contraction on joints 12-13; a white adventral line. Feet pale; setae black.

*Stage V.* Head round, scarcely bilobed, lobes full; green on face, vertex red brown, a pale yellow band on lobe above, running to ocelli, with brown again below it, antennae long, light red; width 1.6 mm. Body moderate, uniform, anal feet spread triangularly; segments slightly folded annulate. Light green, opaque, a series of dorsal intersegmental patches of red brown mixed with yellowish, on thorax and joints 10-13 forming a nearly continuous band. Foot of joint 10 brown; of 13 brown behind. Thoracic feet green; tubercles small, dark, in pale rings; setae dark; venter white subpruinose.

Larvae from Kaslo, British Columbia, feeding on *CEANOTHUS*.